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ABSTRACT

This paper examines the various theories of motion relating to visual communication media, discusses the syntactic rules of moving images derived from those of still pictures, and underlines the motions employed in the construction of moving images, primarily television pictures. The following theories of motion and moving images are presented: Real Movement Theory; Induced Movement Theory; Apparent Movement Theory; and Phi Phenomenon Movement. Time is the essence of change sequence or motion, and is explored in terms of physiological, objective, and emotional, subjective, or psychological types of time. All pictures are icons by definition, and the iconic level of moving images is discussed. Points of view in constructing visual images include the objective, subjective, and medium creative approaches, and the three types of motions used in the construction of television imagery are primary, secondary, and tertiary. Additional types of motion include movement of the performers or objects themselves in their environmental space; the motion of the television camera that generates a variety of movements and provides various points of view of the recorded event; and movements created by sequencing pictures and editing, including implied motion, accelerated motion, slow motion, arrested motion, rhythmic motion, abrupt or sudden motion, transitional motions, and superimposition. (Contains 43 references.) (MAS)

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The Syntax of Moving Images: Principles and Applications

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Nikos Metallinos

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Abstract

Empirical research on picture perception, comprehension, and composition in the field of visual communication media has not explored thoroughly, and it has not seriously considered the syntactic differences between still and moving images. The role of motion in the study of visual images has only occasionally been theorized, decisively down-played, and persistently overlooked. This paper (a) examines the various theories of motion relating to visual communication media, (b) discusses the syntactic rules of moving images that derive from those of still pictures, and (c) underlines the motions employed in the construction of moving images, primarily television pictures.

Introduction

The skillful control of motion and its effective application in structuring visual images is only an occasional practice by film and television program directors. The role of motion in the study of visual images has sporadically been theorized by visual communication media scholars (Arnheim, 1969; Gibson, 1968; Zettl, 1990) and empirical research that verifies the theories is minimal (Metallinos, 1985). The textbooks of film and television picture composition persistently downplay the importance of perceptual information provided by camera motion (Kipper, 1986); they decisively overlook the significance of object camera motion (Johansson, 1975); their commentary centers, mainly, on the role of motion in film and television editing techniques (Wurtzel, 1983; Zettl, 1993); and occasional articles on the differences and similarities between print (the written word) and electronic media (moving images) consider motion a factor, a construct, that generates a sense of reality (Kaha, 1993; Wober, 1988), bypassing the perceptual, cognitive, and compositional reasons for it.

A review of literary sources regarding the synthesis of moving images indicates that the main reasons that delayed the creation of a universally accepted syntax of moving images are as follows:

1. Most of the influential pioneer scholars of visual communication media claim that there are powerful similarities between still and moving images when we consider their perceptual messages. For example, in *Movement, Film, Communication* Saul Bass (1966) states:

> We tend to think of movement and time-span as the unique attributes of film. Yet these qualities are common to both painting and film. If we should examine, let us say, a Ruben's painting, we should see that it has a built-in time-motion factor. When a painting surface has objects placed upon it, a sequence in time

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must be assigned to these objects. We see them sequentially, albeit with infinitesimal time duration between each step. (p. 200)

2. The perception and comprehension of motion, let alone its skillful composition, are considered by most pioneer visual communication media scholars complex phenomena always interrelated to space and time. As such it was--and still is for many researchers--a compositional factor readily explained with the term adopted by still pictures, including paintings, photographs, and frescoes. Because for some visual media researchers film and television images are still pictures--which these media mechanically turn to moving pictures--they do not need to be examined separately. As Dondis (1973) states:

> But note, even in this form [motion picture] true movement does not exist as we know it; it lies not in the medium, but in the eyes of the beholder through the physiological phenomenon of "persistence of vision." Movie film is really a string of still pictures containing slight changes, which when reviewed by man in the proper time intervals, are blended together by a holdover factor in seeing so that the movement appears real. (p. 64)

3. The most important reason for the delay in the creation of the syntax of moving images is the lack of communication between academic researchers and the traditional barriers that separate the arts and humanities from the sciences. For example, whereas research findings in the fields of perceptual psychology, physics, neurophysiology, and experimental psychology have studied and have revealed the various motions (real, induced, apparent) as they relate to visual images, in the field of communication we are either not cognizant of these findings or we are unable to explain them in communication media related terms (Fletcher, 1985; Metallinos, 1977, 1983).

The information explosion and computer technology have now broken the barriers between disciplines. Consequently, the suggestions of the pioneer scholars of visual communication media to explore the potentials of motion in the kinetic arts media of film and television and to create a unified syntax of motion can now be implemented. We need to point out the differences between still and moving images; to underline their diverse perceptual, cognitive, and compositional properties; and to emphasize the advantages offered by the various forms of motion over the limitations of the still images. As Moholy-Nagy (1969) pointed out years ago:

> While in photography not the camera but the light sensitive emultion is the key to genuine work, in the motion picture not the emultion, but the possibility to produce motion is the key to the film production. And yet there is no theory for the use and control of motion. In the majority of films, motion is still so primitively handled that even its basic principles remain to be involved. Practical experience has been confined to a few decades and the eyes apparently are as yet untrained to receive sequences in simultaneous motion. In the majority of cases the multiplicity of movements, even if well controlled, still convey the impression of chaos rather than organic unity. (p. 278)

Advances in new visual communication media, such as three dimensional film and television, holography, high definition television, and computerized images, have occurred since Moholy-Nagy (1969) and other pioneers such as Kepes (1966), Arnheim (1969), and Gibson (1968) suggested a closer look at the perceptual, cognitive, and compositional properties and potentials of motion in the structure of moving images. Yet, a unified, confined, and universally accepted syntax of moving images is non existent.

This paper argues in favor of the creation of such syntax and provides the theoretical bases for its implementation. Specifically, this paper (a) reviews the various theories of motion that relate to visual communication media, (b) discusses the syntactic rules of moving images stemming from the compositional principles governing still images, and (c) underlines the major motions employed in constructing visual images, and primarily television images.

Theories of Motion and Moving Images

The scientific arguments regarding motion perception and its subsequent movement comprehension are centuries old, diversified, and still appear inconclusive (Marr, 1982). The study of the perception of motion, on one hand, has always been very complex mostly due to the various extreme and multifaceted forms by which motion occurs. For example, in addition to the extreme velocities of motion that are present but we do not perceive (i.e., bullets shot from a gun or the slow process of the growing of the plants), in the perception of motion such complex factors as change, time, direction, distance are involved (Murch, 1973). The study of the comprehension of movement, on the other hand, depends on the observer's own abilities, convictions, beliefs, and memories to transform diverse motion codes to cohesive cognitive movements (Spigel, 1968).

These scientific arguments regarding the study of visually perceived and mentally conceived movements have generated three main theories of motion known as *real movement*, *induced movement*, and *apparent movement* (Spigel, 1968), each of which subdivides into various forms (or types of real, induced, or apparent motions). To provide the literature regarding this topic I will review, first, these motion theories (and their subsequent forms) and then I will underline their interrelationships, to provide the bases and to establish the parameters upon which the syntax of moving images should be built.

The Real Movement Theory

The real movement theory states in effect that: The successions of changes of objects, subjects, or events in the environment are the cues that the observer receives and develops his/her conception of occurrences of motion in the environment. Known also as *absolute*, *threshold*, or *objective movement* theory, this theory, according to Gibson (1968), incorporates the motions caused by changes of an object in the environment, changes of the position of the observer, changes of objects or subjects while the observer moves, changes of the heads and/or the body of the observers.

Neurophysiologists who have studied the real movement theory suggest that greater visual acuity regarding the perception of motion is found in the periphery rather than the center of the retina, in the rods rather than the cones of the fovea (Bloomer, 1976; Gregory, 1966). The area of the brain in which the coded motion signals are processed and translated into movements is mainly the visual cortex, also known as the striate cortex (Bloom, Lazerson, & Hofstader, 1985). The degree of comprehension of real movement depends on the degree of homogeneity of the environment, the size of the moving objects and their brightness. After repeated experiments on these factors, Spigel (1968) concludes that: "...the more homogeneous the field the greater the rate of motion required for the emergence of perceived movement. Lower thresholds were also obtained with decrease size and brightness of the moving target" (p. 104).

It is, therefore, apparent how significant the real movement theory is for the construction of the syntax of moving images and its subsequent application to film or television programs.

Induced Movement Theory

The induced movement theory states,

in effect, that the perception and comprehension of moving objects occur when their hierarchy of interdependence, developed by Duncke (1929), and their relationships as figures and grounds, developed by Hebb (1949), are present during the succession of changes. As Spigel (1968) states:

> The idea that motion is a quality conferred upon as an object by an observer is clearly illustrated by the phenomenon of *induced movement*. With two objects or stimulus elements arranged such that one is the surrounded for the other, regardless of which is set in motion, it is the surrounded target that is inevitably perceived as the element that is moving. (p. 105)

Also known as "figure of reference" (Bloomer, 1976, p. 96), or "relativity of movement" (Gregory, 1966, pp. 111-114), this theory is fundamental to the study of visual images for the following reasons: (a) it provides the foundations on which all objects are perceived in the field, orderly and in accordance with their prominence; (b) it allows the observer to make clear distinctions between objects moving across a particular background and a stationary background that is used as frame of reference, and (c) it identifies and helps to explain *motion parallax*, an artifact of the visual field that occurs when the observer moves his/her head or body, changing the spatial relationship between the eyes and the environment. These motion syntactic constructs should guide the constructors of moving images, particularly the composition of television images that require constant motion and change.

Apparent Movement Theory

The apparent movement theory refers to a series of phenomenal displacements that lack physical or real movement; they are illusionary, rather than real; they give the impression of natural movements, when in actuality the displacement of objects in space and their continuity is not physiological; it is indirect, inferred, or apparent (Bloomer, 1976; Gregory, 1966; Murch, 1973; Spigel, 1968).

Visual perception paradoxes created by various apparent movements, have been the concern not only of the pioneer neurophysiologists and perceptual psychologists cited above but primarily the Gestalt psychologists and visual communication media scholars. Due to the arrival of motion pictures (cinema first, and later on television and computer images), scientists of the apparent movement theory have identified and studied more closely the various types or forms of apparent movements known as the *phi phenomenon*, the *persistence of vision*, the *autokinetic effect*, and the *movement aftereffect*. I will discuss each of these forms of the apparent movement theory in reference to their contribution to the study of the visual communication media of film and television.

The Phi Phenomenon Movement

This movement has assumed its name from the pioneer gestalt psychologists who considered a number of illusionary, somewhat paradoxical, and unreal motion instances and studied them separately as basic types of apparent movements namely alpha (α), beta (β), gamma (γ), and delta (δ).

The *alpha movement* occurs when a successive presentation of a rotated figure, a trapezoidal window with distinctive lines, appears to expand or contract with the successive presentation of each position of the figure. The bases for the illusion of motion generated by alpha movement relies on the fact that the observer is conditioned to assume that a line is of a constant length and that the illusion is a result of a depth change in which the line moves closer and then retreats. Our firm beliefs and habitual convictions insist that what we see fits our previous experience. When, in reality, what we think we see is not what it is. These factors are also important. The successful interpretation of visual images

depends on the accuracy by which they are constructed in the visual fields of the film and television screens so that they will not be misinterpreted and misunderstood.

Beta movement occurs when two spatially separated stationary targets are presented in succession during which the delay intervals and the distance between the targets have been proportionally analyzed to create the illusion--the apparent motion--of a single target moving from the position of the first target to the position of the second (Murch, 1976). For example, if the two targets were two flashing lights, rather than perceiving two lights flashing off and on we see a single light moving back and forth in a lateral direction. The successful beta movement effect can only occur when there is a perfect correlation and an optimal relationship between the factors *temporal intervals*, *spatial distance*, and *target illumination*. We can achieve the beta movement effect and we can use it successfully in structuring moving images as long as we are aware of their perceptual factors, their relationships with other visual elements, and their interactions.

The *gamma movement* occurs when the illumination level of a target increases or decreases, creating the sense that the size and the depth of the target are increasing or decreasing, thus creating an apparent change or movement. For example, when two separate but equal in size targets are either independently illuminated in equal temporal intervals, the illuminated target seems to move forward, decreasing the distance from the observer, and vice versa (Murch, 1978). The gamma movement depends on two main factors, the spatial arrangements and temporal intervals of the targets, and their subsequent illumination that maximize the changes of their size and their depth and create the apparent motion. These parameters are compositional tools in the hands of constructors of moving images and constitute the syntactic rules in the grammar of motion picture composition.

A strange phenomenon known as *delta movement* occurs when the stimulus conditions of the beta and gamma movements are combined. Both the temporal change of flashing lights (beta movement) and the illumination reduction or increase of the target (gamma movement), when they occur simultaneously create a change or the illusion of a motion in depth, which is defined by Murch (1976) as ". . . a lateral movement of the target from position 1 to position 2, as well as a movement in the third dimension" p. 281. Because delta movement, when applied to objects in the environment provides a sense of depth, it becomes an important syntactic construct of moving images, and is very practical in its adaptation in the construction of moving images.

In his collective examination of these four types of apparent movements, Gregory (1966) emphasizes first the importance of the phi phenomenon for the creation and the believability of cinema and television. He comments on the degree of tolerance of our perceptual apparati to provide spatial and temporal connections for the organic operation of these media. He concludes that: "The phi phenomenon does tell us something about the image-retina system: namely, that it is reasonably tolerant in its demands—which makes the cinema and television economically possible" (p. 111).

Closely related to the four types of illusionary motions of the phi phenomenon is yet another type of apparent or illusionary motion that we will call the *cinematic motion*. It is created by a phenomenon known as *persistence of vision*, which, simply stated, is the inability of the retina to follow the signal stimulation in rapid fluctuations. The process of image stimulation continues beyond the initial stimulation for a fraction of a second, merging separate images with one another, thus creating the illusion of a continuous and organic succession of moving images.

Both media, film and television, rely on the paradoxes of these two distinct visual facts, the phi phenomenon with its

various types of movements and the persistence of vision, which is also known as retina lag (Bloomer, 1976). Both media depend on the physical law known as critical fusion frequency that determines at what point (what speed) the fusion of static pictures into a continuous flow of images occurs. The higher the flashing of lights frequency, the better is the fusion and, therefore, the less the flickering picture effect. The established rates of the twenty-four pictures per second projection for the cinema and the thirty frames per second for the television frame, although they are both below the critical fusion point, have been the standard projection rates with the support of special shutters (in the case of cinema) or faster moving interlaced rasters (in the case of television picture frame generation).

Although film pictures are generated differently than television, both images are subjects to *cinematic motion* theory. That is their rapid projections (above the initial fusion frequency point create the persistence of vision, which results in the illusionary cinematic motion. In other words there do not seem to be great differences in perceiving and decoding the cinematic motion of the media of film and television as we were led to believe when television first appeared. There do not seem to be grave differences in the aesthetic quality of the images produced by the two media since High Definition Television pictures are equal to those of film (Metallinos, 1991). These factors are crucial for the creation of the syntax of moving images and its subsequent application to film and television programs (Mathias & Pattersson, 1985).

A second major category of the apparent movement theory is the so called *autokinetic effect* (Greek: meaning self-moving, or moving independently), which occurs when a light, or a bright object, is placed on a homogeneous (mainly black) background and appears to move in all directions and at varying speeds as the observer moves. The illusion of motion is created because the dark background does not provide a clear textured reference for the figure (the light or the bright object). Consequently, the inability of our visual organs to distinguish adequately between the movement or drifting of the eye and the drifting of an object in space are the main reasons for the autokinetic effect (Rock, 1966). The structure of the environment, the background on which objects and events occur, plays a significant role in the perception of figures. Equally significant are the factors time and the size and intensity of the light as well as the stored memory of the observer.

Concerning time and place factors involved in the development of autokinetic movement and the factors of size and brightness of the objects, Spigel (1966) suggests that:

> The phenomenon [autokinetic effect] involves movement perception in the absense of displacement of the stimulus in either time, or space. A fixed luminous source in an unarticulated surround—one which reduces to a minimum any frames of reference or stability – is seen as moving in an erratic, unpredictable fashion. . . .Generally, the larger the light the weaker the auto-kinetic effect obtained. (p. 100)

As far as the role played by memory in decoding and explaining the autokinetic and audiokinetic movements, Murch (1976) suggests that:

> The influence of such extrinsic and intrinsic instructions on autokinetic and audioautokinetic effects suggests that the control processes and long term storage are integrally involved. Faced with an ambiguous stimulus situation the subject produces a perceptual response from his own repertoire of responses. (p. 73)

This is true, of course, with the perceptual processes of all phenomena, i.e., light, color, and sound. It is for this reason that the construction of easily distinguishable environments, the clear indication of time and location, and the precise identification

of size, direction, and shape of objects in the environment are such important motion syntactic factors. We must consider them thoroughly and we must skillfully apply them in structuring moving images of film and television media to obtain clarity in our moving images.

The last category of the apparent movement theory is the *aftereffect movement* also known as the "water-fall effect" (Bloomer, 1976, pp. 100-101; Gregory, 1966, pp. 104-119; Spigel, 1966, pp. 111-113). This effect occurs in several instances such as (a) when we look steadily and intensely at the center of a moving phonograph record and then we suddenly look away or close our eyes, (b) when we persistently look at the center of a black spiral on a white background and look away or close our eyes, or (c) when we watch for a while flowing water, such as a river, and then we turn and look at a fixed subject. In all of these cases, apparent motion is an after movement in the opposite direction, which seems to be both paradoxical and inexplicable.

Although the aftereffect movement has been known since the ancient Greek civilization, neither physicists, neuro-physiologists, nor perceptual psychologists have yet found the exact physiological reasons that cause the aftereffect movement. They have only speculated about it. For example, Gregory (1966), in explaining the aftereffect movement paradoxes, suggests that it must be attributed to the image/retina rather than the eye/head movement system. He proposes that two systems are involved—velocity and positional subserve movement perception. Bloomer (1976), summarizing the scientific speculations, concludes that:

> Just why the waterfall effect occurs is not clear. Some theories suggest that it results from overload firing of the specialized cell circuits in the brain that responds to motion. Other researchers feel that adaptation processes in the retina are at least partly responsible. In any case a stationary reference within the visual field appears essential for the waterfall effect to occur. This illusion, fortunately, does not happen when the moving field covers the entire retina. If it did, we would suffer the waterfall illusion of every sudden automobile stop. (p. 101)

The factors, therefore, which determine the aftereffect movement such as motion velocity, object position, the cooperative effort of peripheral and central vision, the objective and apparent movement, and the image/retina movement rather than the eye/head, are the constructs that comprise the parameters of the syntax of moving images.

An interesting and lengthy dispute has occurred, over the years, among visual perception researchers regarding the differences between real and apparent visual movement perception processes (Kolers, 1967; Matin & Mackinnon, 1967). The dispute centered precisely on the issue regarding the retina mechanisms for movement perception in real and in apparent motion. Gibson (1968, 1979) himself raised the dispute when in his early experiments with motion he suggested that the perception of motion should be based on the study of the retina mechanisms (1968) and later on, with new experiments and new findings, he concluded that the perception of all events, real and apparent, depend on "the disturbances of structure on the ambient array" (1979, p. 170). The transformation of the visual array, rather than the retina mechanisms can explain the differences between real and apparent movement perception. This argument has prevailed and has been confirmed by all contemporary prominent scholars of visual perception mentioned above, and has been summarized by Murch (1973) as follows:

> There are meaningful differences between the two [real and apparent movements], particularly in the speed of displacement, since the occlusion and disocclusion of the background are continuous in real

> movement and discontinuous in apparent movement. Nevertheless, the transformations of the ambient array are very similar in both instances. Therefore, if real motion perception is the result of continuous experience with objects in transformations in the external environment, then the conditions of apparent movement would be those producing highly similar transformations. So similar, in fact, that the observer often cannot discriminate between the two. (p. 287)

Our experience with the various transformations of the ambient array of light which objects in the environment reflect, is all we can perceive in either case, real or apparent motion. Therefore, arguments regarding the relationships between real and apparent motion perception, among other things, reveal to us how significant reflected light is in the perception of still and moving objects as a syntactic factor in the construction of moving images. After all, it is light that we manipulate and control to generate the moving visual images of film and television.

The Syntactic Rules Governing Moving Images

The evolutionary changes that occur in nature provide the foundations for the understanding of the kinetic media of film and television. As it is evident that the observed changes of the natural phenomena are explained in terms of the laws of causality, so it is logically inferred that the changes of the moving images must be governed by the same logical evolutionary processes. On the bases of the theories discussed above and the analysis of their constructs, the syntax of moving images can be extracted and the grammar of the composition of moving pictures can be structured logically and evolutionarily. Such grammar must also consider the existing perceptual, cognitive, and compositional factors of still visual images verified and empirically supported by previous research and experimentation.

Yet the element of motion is the new dimension, the new dynamic component added that enhances, completes, and redirects their potential applications. In its effort to bridge the syntactic rules governing still images with those related to moving images this section entertains the following questions: (a) How are time, change, and motion perceived and applied in motion pictures? (b) Which iconic levels of visual images are common to both still and moving pictures? (c) What specific points of view are mutually expressed in still and moving images?

Time, Change, and Motion

As it was pointed out earlier, motion implies change and change occurs in successive intervals of time. Therefore time is the essence of change sequence or motion. As Marr (1982) points out:

> . . .more so, perhaps than any other aspect of vision – time is of the essence. This is not only because moving things can be harmful, but also because, like yesterday's weather forecast, old descriptions of the state of a moving body soon become useless. On the other hand, the detail of the analysis that can be performed depends upon the richness of the information on which the analysis is based, and this, in turn is bound to depend upon the length of time that it is available to collect the information. (p. 162)

Arnheim (1969) also points out that motion, change, and time are interrelated and that one is not easily perceived without the other. Furthermore time, as a dimension of change involves the presence of things past (i.e., experiences stored in memory), the presence of things present (i.e., experiences of things happening now), and the presence of things future (i.e., experiences we expect to undergo in the anticipated causality of happenings). Not only does time determine the flow of change and motion, it also provides

causality and logic to events and happenings thus providing an orderly, meaningful, and organic sequence of events (Arnheim, 1969).

The various types of time under which the media of film and television operate are, according to Zettl (1990): (a) *objective* also known as clock time, (b) *subjective* also known as psychological or emotional time, and (c) *biological* or physiological time.

Physiological time refers to the biological arrangements that determine the organism's changes such as eating time, playing time, seasonal time, and entertainment time. It is not so much the objective time or the emotional experience of time that motivates the actions of an individual rather his/her own biological clock that dictates change. This factor is an important syntactic component in moving image composition because, biologically, it is known that if the metabolic or physiological time for the perception and enjoyment of moving images is not appropriate communication breaks down.

Objective time is equally an important compositional factor in structuring moving images because it identifies the real time event and specifies the exact time it occurs. The media of film and television depend on real time for their operation and every hour, minute, and second of real time are revenues. Time means money to the expensive medium of film and television. More so to commercial television that operates on the marketing of time.

The emotional, subjective, or psychological time is even more significant as a syntactical factor in the grammar of moving images. In fact, the degree of the success of a film or a television program, and its aesthetic fulfillment, depend on the proper usage and manipulation of the emotional time of events involving the presentation and the visual narration of the programs.

The running time of approximately ninety minutes (in objective-clock time) is the normal rate of a film whereas the storytime—narrating the fictional events of the movie--varies considerably, depending on the script. The running time (actual length) as well as its storytime also depend on the nature and the objective of the program and they differ considerably from one program to another.

The control and proper manipulation of these three types of time are the prime tasks of constructors of moving images. The greatest obstacle, however, occurs in the control and the skillful manipulation of the timing of moving events and the temporal order of the succession of images, as it is explained in the last section of this paper.

The Iconic Levels of Moving Images

All pictures, by definition, are icons. They are representations of the things, the objects, subjects, events, and circumstances they depict. There are various means by which pictures are generated (such as paintings, drawings, frescoes, photographs, films, slides, video, holography, computerized images, cartoons), and each of these means constitutes unique media that generate them according to the medium's own use of its instruments, materials, and techniques (Metallinos, 1985; Tarroni, 1979). The communication objective of the pictures determines which medium should be used to convey the message. Consequently, pictures communicating religious messages are mostly religious icons, and frescoes found in churches. On the other hand pictures that communicate the benefits of a product are mostly colored photographs found in commercial magazines, television commercials, etc.

Although the communication objectives of each medium vary considerably, the iconic levels of moving images, regardless of the medium that generated them are symbols, abstractions, or representations (Dondis, 1973). The

quality of the icons, their sizes, colors, and compositional structure are, of course, very important syntactic factors that must be considered when we analyze and synthesize moving visual images. However, the iconic level of a television or film image, that is whether the information communicated is an abstract image (e.g., a cartoon), a symbolic image (e.g., a stop sign), or a representational image (e.g., a photograph of an actor), is a crucial syntactic factor in structuring visual images in film and television. In fact, the entire anatomy of a moving visual message depends on these three levels of icon construction. This has been the practice of the great masters of still pictures who reproduced the phenomena of the real world (objects, subjects, and events) in their framed pictures (the visual field) abstractly, representationally, or symbolically.

Points of View in Constructing Visual Images

In motion pictures we have the ability to frame live action the moment it occurs and in accordance with our own particular point of view, by choosing to look at the action from far away (e.g., a long shot of a city), to look into the action (e.g., an extreme close up of one street of the city), to distort, change, and even reorganize the event by manipulating the recording facility and the medium (e.g., a superimposition of a man standing in front of the city).

When we frame the action from far away we look at the events totally objectively, as uninvolved observers or bystanders. We call this the *objective approach* to composing moving images and it is found frequently in film and television programs. These shots provide a panoramic vista that allows greater flexibility of movements of both the object photographed and the photographer. Such an approach sometimes is called the landscape, the environmental, or the establishing shot approach. It is an excellent syntactic rule in composing visual images because such an objective approach relates easily to the image composer's live experience with the phenomena in the visual world, while it offers greater area for free motion of events as well as the camera that depicts them.

When we frame the action from very close we look into the event totally subjectively, submergibly involved in the event as participants rather than observers, taking part or touched by the occurring phenomena. We call this the *subjective approach* to composing moving images and it is found readily in psychological film and television programs. This approach sometimes is called the inner landscape, emotional, or psychologically involving shot, and, this, too, is a powerful syntactic rule in composing moving images. The physical movement in the subjective framing approach is mostly minimal, or slow. However, the emotional involvement energizes the subjective time factor and creates its own unique feeling of events occurring in their own time and medium space, at their own speed, as it is expressed in intensive love sequences in film and television.

The third point of view in constructing moving images is known as the machine dependent or *medium creative approach* to framing and recording of an event. In this case the motion picture constructor does not simply observe or submerse into the event, but he/she uses the medium's own materials, instruments, and techniques available to recreate the event. In the example of the man standing in front of the city, the television's own uniquely available technique of chromakey (in which one picture is keyed into another), allows two different and separate environments to be simultaneously present in a picture, both live and both in motion. The creative point of view in constructing moving images is decisively downplayed and overlooked by conservative North American commercial or network television program directors whereas the experimental, underground, and unconventional videos (e.g., MTV) have used it to the point of obscuring it

(Metallinos, 1988; Zettl, 1990).

In summary, the syntactic factors of time, change, levels of iconic presentation and specific points of view in constructing moving images are commonly used and derived from the aesthetics of the arts and applied equally to the composition of moving images, in which motion is the basic syntactic factor.

The Specific Motions Used in the Construction of Television Images

As stated earlier, all three major theories, real, induced, and apparent, regarding the perception and comprehension of moving objects are important syntactic constructs for the creation of the grammar of moving images. Some additional types of motions, however, are also in operation when we are constructing moving images within the visual fields of film and television screens. We call them visual forces operating from within the concentrated space of the film and television screens and they are *main direction*, *magnetism of the frame*, *attraction of mass*, *asymmetry of the screen*, *figure/ground relationship*, *psychological closure*, *gestalt*, and *vectors* (Metallinos, 1978; Zettl, 1990). The derived motions from real, induced, and apparent, and the visual forms generated in the visual field are the following three specific motions that we must carefully consider.

The three specific types of motion are known as primary (or movement of objects), secondary (or movement of the camera), and tertiary (or movement created by sequencing images), (Arnheim, 1966; Metallinos, 1992; Zettl, 1990). All three are related to the syntactic factors of time, space, and change, to the three levels of iconic composition (symbolic, representational, and abstract), to the three points of view employed in constructing moving images (objectively, subjectively, or creatively). All three are interrelated; they work cooperatively; they rely on the presence and support of each other.

Movements of Objects or Subjects

The first movement we employ is the movement of the performers or objects themselves in their environmental space in front of the camera. This is the primary motion connoting the event itself and varies in speed, direction, and duration. That is, it can be a speeding car or a loaded truck driven slowly uphill, an object or performer moving towards the camera (inward movement) or away from the camera (outward movement), an accelerated (fast forward) or decelerated (slow motion) movement. Each of these motions constitutes the primary event and their application must be dictated by the script, determined by the producer or director, and justified. However, the aesthetic factor that justifies the application of the primary motion's numerous forms (fast, slow, upwards, downwards, inwards, outwards, etc.) must be based on the composer's own experience, knowledge, artistry, and skills. The syntax of motion in the kinetic media will provide such needed guidelines for the constructors of images (Gibson, 1950).

Like the various uses of the tenses of a verb (e.g., present, future, indefinite, past perfect), in constructing grammatically a sentence, so are the uses of various forms of primary motion in the construction of moving images. The choice in the selection of primary motions must be both logical (or syntactical) and consequential (or grammatical), providing the links that connect the parts of the visual sentence.

Movement of the Cameras

The second major type of motion unique to the media of film and television is the motion of the camera that generates a variety of movements and provides various points of view of the recorded event. The average film and television cameras are equipped to dolly-in or dolly-out, to zoom-in or zoom-out, to pan (right or left), to tilt up or down, to truck or arc in either direction (right or left) to pedestal up or down, and to be craned or boomed

in all directions and at varied speeds (Zettl, 1993).

Empirical research on the value and the particular application of each of these camera movements is scarce and has not been considered by visual communication media scholars (Kipper, 1986; Miller, 1969; Monaco, 1981; Tiemens, 1970), although film and television production practitioners and media theorists have both experimented and theorized with them and about them extensively since the arrival of film and television. Visual communication media producers and/or directors should consider the following: (a) That the value and the subsequent application of each of these camera movements should be based on the logic and the situation demanded by life experience and the story. For example, a slow dolly-in rather than a fast zoom-in should be applied to a scene in which a performer (a teacher in a large classroom) walks slowly from one desk to the next, observing the work of the students. (b) That intuition alone or unintentional experimentation with any such camera movements is often undesirable and unreliable. For example, a sudden and unanticipated camera movement such as a fast pan or tilt is an unrealistic and hence disturbing act which diminishes, rather than enhances, the normal flow of visual communication. (c) That only after careful observation, constant application, and theoretical knowledge of the various effects (perceptual, cognitive, compositional, communicative) of each and every one of these camera movements should the producer of moving images apply them as syntactic factors of such images.

Movements Created by Sequencing Pictures. Editing.

A unique form of motion is created within the restricted space of the film and television screens when one visual image is followed by another. The succession or juxtaposition of visual images creates the illusion of motion. The specific direction of such motion is determined, mostly, by the index and motion vectors of the visual images themselves. The forces in operation that create motion are the psychological principles known as closure (Murch, 1973) and figure/ground interdependence (Bloomer, 1976). Due to psychological closure, when we see two pictures, one following the other, we have the tendency to continue the sequence to complete the action or the event illustrated by the picture. For example, if we see a picture of a man holding a knife, succeeded by a picture of a person wounded, we immediately conclude that the first person moved and hurt the second person. It is a cause-effect phenomenon that influences our perception of images. The second force in operation in the creation of motion of visual images is the change of the environment and its relation to the figures in front of it. For example, if we see a picture of a car in front of an office building, followed by a picture of the same car in front of a house, we assume that the two different frames of reference--the two backgrounds--represent the motion of the car from the work place to the house. Both perceptual forces are strong forces that generate otherwise unintentional motion when visual images are juxtaposed.

Yet when the succeeding of visual images is intentional the resulting motion is called montage, or editing. All montage is the result of motion generated by successive visual images appearing on the film and television screens, regardless of the time interval and the duration and speed by which they occur. It is beyond the scope of this paper to analyze the various forms of editing and to provide their syntactic values in the general grammar of visual communication media composition. Instead, this paper will concentrate on the compositional value and the syntactic significance of *implied*, *simultaneous*, *fast*, *slow*, *rhythmic*, *abrupt*, *transitional* motions that are available and are manipulated at will by the constructors of film and television images.

Implied motion exists in all still art forms such as sculpture, painting, and photographs and it has been known to

artists since the dawn of civilization. By manipulating the various visual elements within the visual field the masters of still art have managed to create a sense of motion in otherwise motionless pictures. The graphic forces used to create the illusion of motion vary but the most commonly used are the various directional lines known as vectors (Zettl, 1990). Vectors are not only the strongest indicators of direction, they are the prime generators of implied, inferred, or imaginable motion. The eyes of people of a painting looking towards a direction, fingers pointing, arrows indicating an area, etc., are either graphic or index vectors, which imply motion as they point towards a general or specific direction.

Motion vectors created by moving images within the screens in film and television are, of course, the strongest indicators of direction but they are also indicators of the degree of forcefulness or magnitude of the movement. Continuity and converging vectors are also strong indicators of implied motion that is extensively used in still and motion picture composition (Bloomer, 1976).

Simultaneous motion occurs when both the frame of reference (the background) and the event (the figure) move simultaneously as for example, in the case of an airplane moving in reference to the sky and the passengers within the plane in reference to the interior of the airplane. Known also as motion paradox this type of motion is very common and is constantly present in recording moving images in which both primary and secondary motion occur simultaneously. Simultaneous motion is a powerful syntactic tool in the hands of moving images directors because it creates this motion paradox in which an object can be interchangeable in motion and at rest at the same time (Zettl, 1990), depending on what frame of reference the viewer chooses to consider in the images he/she observes.

Fast, or *accelerated motion*, is also a powerful syntactic construct of moving images and has been used, extensively and often successfully, in films and in television programs in such scenes as car chases, car and horse races, airplane combats, etc. The movements of objects, subjects, and events are sped-up, creating a faster than normal flow of action that exaggerates motion and reinforces the meaning, the visual message of the event. Accelerated motion is an excellent indicator of the passage of time when used to speed up a naturally slow process such as the blooming of a flower, the gathering of clouds before a storm, or the seasonal changes in the present. The manipulation of accelerated motion by the medium of film has been applied successfully in comic scenes (e.g., the Charlie Chaplin movies) or dramatic scenes (e.g., the famous Eisenstein movies). Accelerated motion is an excellent syntactic factor that constitutes an excellent moving image aesthetic agent when it is not used solely to impress or to attract the attention of viewers (Metallinos, 1989).

Slow motion is also a unique feature, a syntactic construct of moving images available to film and television directors to be used when the situation demands it. The compositional value of slow motion is very significant when it is used to reinforce the meaning of the visual message, rather than to obscure it. For example, if the communicative purpose of slow motion is to slow down the action so that viewers can see the details of an event that occurred very fast, such as a car crash, the application of slow motion is appropriate. On the other hand slow motion should never be used to break the normal flow of a scene if the ultimate purpose of the scene is to build up tension. Although the application of slow motion is found in numerous films and television programs of considerable notoriety, its best usage and value have been in experimental, instructional, educational, and documentary programs such as medical and children's programming.

An extreme form of slow motion is the *freeze frame* also known as *suspended* motion, or *arrested* motion (Zettl, 1990).

The perceptual and emotional effect of the freeze frame is that of suspending an action that wants to continue. It is a useful syntactic factor that provides a sense of suspense, tension, and curiosity to the visual communication circumstance when used sensibly, according to the demands of the script, and tastefully.

Rhythmic motion is the characteristic reoccurrence—in equal temporal intervals—of an event and refers to the flow of the segments of the event (Zettl, 1990). The equal temporal intervals that determine the rhythm and set the pace of the program generate the presence of a motion, physically or emotionally. Music videos are the best examples of the use of rhythmic motion. They are transitions between images, scenes, and sequences that are detectable by the particular rhythm of the musical piece. Once the rhythm of a musical piece is set and the pace is established, it is difficult to break it. Physically and psychologically we submerge to the flow of the event. Rhythmic pace is a strong motion syntactic factor also used extensively and quite successfully in television commercials. However, the establishment of the rhythmic pace, and its subsequent use and control, are not easy tasks and require both "sensibility" and "experience" (Zettl, 1990, p. 281).

Abrupt or *sudden motion* occurs when we suddenly interrupt the normal flow of an action and cut to a new, unexpected environment and event. There is still implied motion, which is mostly created by psychological closure, but the normal expectation of the occurrence of the old event is interrupted by the sudden appearance of a new event (Tiemens, 1994). In the media of film and television cutting from one picture to the next without the proper warning and anticipation, creates the abrupt motion, or stopping, between shots. Cutting from one visual image to the next is the most common editing technique in television and film. However, if the forthcoming image is not anticipated by the viewer the sudden motion of cutting creates two serious problems which interfere with the communication process. First, the surprise creates the so-called "jump-cut" in which not only the normal flow of action is interrupted and a new environment appears, but the normal directions of the visual elements within the picture field are scrutinized, resulting in unrelated and unrealistic jumps (Zettl, 1990, p. 290). Second, the jump cut generates the motion of a missing action between the preceding event and the one that follows. If viewers are unable to fill-in the missing link that connects the two events, due to the sudden change of the cut, they are disoriented and disturbed. Psychological studies on this issue have shown that abrupt motion generated by cutting should be avoided in programs addressed to preschool children and in programs addressed to those who are visually illiterate or unfamiliar with the media of film and television (Goldberg, 1951; Penn, 1971).

For advanced and visually literate film and television viewers the sudden motion created by the cut between pictures is both acceptable and at times welcome. It can be used to increase viewers' attention and involvement with the program. As Zettl (1990) suggests:

> The cut violates the expected smooth continuity and jolts our perceptual complacency. At the same time it manipulates the character's irrational "jumps" and compels us in a shorthand way to take notice of his or her progressively labile emotional state of mind. (pp. 290-291)

Transitional motions are collectively all other motion effects created by the juxtaposition or sequencing of visual images by way of the unique hardware technologies of the media of film and television such as the *dissolve*, *superimposition*, *fade*, *wipe*, *shrink*, *stretch*, *flip*, *tumble*, and *glow*. Whereas the dissolve, superimposition, and fade are normal transitional modes to both film and television, the rest are special transitional effects found in digital video facilities that vary in technological sophistication and

capability. The rapid development of such transitional motion effects does not allow the close study of their syntactic value and their specific application. They are mostly used because they are available and to impress the viewers rather than for particular aesthetic reasons. Consequently, the syntactic value of the dissolve, superimposition, and fade which have become classic transitional devices in film and television will be discussed.

Defined as the gradual transition from one visual image to the next during which the visual elements of the first image temporarily overlap with the visual elements of the second, the *dissolve* is a commonly used, powerful, and effective motion syntactic factor. It indicates the passage of time and the normal transition of events unfolding in front of the viewers' eyes as they occur. The duration of the dissolve, that is, how fast or slow the transition from one image to the next occurs, is a very significant factor to be considered because it alters the reason of its usage. For example, whereas a very slow dissolve temporarily replaces the superimposition and assumes its value, the very fast dissolve almost replaces the cut and assumes its value. The normal flow of the event and the action dictated by the script should be the guidelines for its use.

Superimposition occurs when one visual image is imposed over and blends with another—both visible at the same time and occupying the same visual space. The transition that imposes and blends the two pictures is the factor that creates the motion, which, when completed, becomes a freeze frame of two interwoven images. It is a significant motion component with a powerful syntactic value when its use is driven by logic, taste, sensitivity, and akin knowledge of the medium. It bridges two different worlds, events, and circumstances that occur simultaneously and at the present time. The superimposition has been applied successfully in dream scenes, flashback sequences, and other such cases where the past or the future need to be seen in the present time.

The syntactic value of the motion created by *fade-ins* or *fade-outs* is found in such applications as opening or closing a show, in terminating an event and starting a new one, and a plethora of other similar situations. In compositional terms the fade-in assumes the role of the opening of the chapter of a story and the fade-out acts as the closing of it. By appearing gradually from black (or nothing) to a visual image, we open the visual fields of film and television and we are ready to tell a story, to unfold an event. Conversely, by going gradually to black we finish the story, we end the action and conclude the event. Like the opening and the closing of a store, a theatrical performance, a church mass, a musical concert, etc., the syntactic value of the motion created by the fade-ins and fade-outs lies in the sensitive, skillful, and tasteful manner by which the opening and closing process are executed. In general usage, however, the normal fade-ins and fade-outs indicate the opening or starting of an event and its subsequent closing or ending.

In summary, all these specific motions used in the composition of visual images in general, and television pictures in particular, constitute the syntactic elements that construct the grammar of the moving images.

Conclusions

The discussions set forth in this paper center on the importance of motion as a syntactic component in the construction of moving images and the necessity to create a syntax of moving images to enhance the basic grammar of visual communication media.

The review of the theories of motion and moving images in the first section reveal that there are major perceptual and cognitive constructs in each of the major motion theories that comprise the syntactic elements of moving images. These constructs have been overlooked by visual communication media researchers and are rarely acknowledged by visual communication media theorists and

practitioners.

The discussions of the syntactic rules governing moving images in the second section demonstrated that the bases for the construction of the syntactic rules of moving images derive from the study of still visual images and that the motion constructs constitute the parameters in which the grammar of moving image composition can be incorporated.

The analysis of the specific motions used in the construction of television images in the third section indicated that the constructors of television pictures can use a variety of motions in their synthesis of television programs—each of which has its particular compositional value and fulfills a specific syntactic purpose unique to the medium.

If we, as visual communication media theorists, wish to create a unified, responsible, and academically acceptable grammar of visual communication media, we should give special consideration and we should place more emphasis on the syntactic constructs of motion. The creation of the syntax of moving images will strengthen the foundations of the grammar of the visual communication media.

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